

<b>CH2M HILL Hanford Group, Inc.</b>	<b>Manual</b>	<b>HNF-IP-0842</b>
<b>FIRE PROTECTION REQUIREMENTS FOR CONSTRUCTION, OCCUPANCY, DEMOLITION ACTIVITIES</b>	<b>Volume Section Page Issue Date Effective Date</b>	<b>9, Safety 5.3, REV 1a 1 of 10 November 20, 2002 November 20, 2002</b>
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## 1.0 PURPOSE AND SCOPE (2.1.2, 2.1.3)

This procedure provides the fire protection/prevention requirements for managing combustibles during all activities and specific requirements for construction and demolition projects/activities. These requirements apply to construction, occupancy, and demolition activities (interior and exterior) within the Tank Farm Contractor (TFC) scope of work. Permits shall be issued by the Hanford Fire Marshal, or designated representative, on an as-needed basis following review of the applicable activity and permit request data.

## 2.0 SOURCES

### 2.1 Requirements

1. 29 CFR 1926, "Safety and Health Regulations for Construction." (S/RID)
  - a. Section 150(a)(4)
2. DOE 420.1A, "Facility Safety." (S/RID)
3. ORP M 420.1-1, "ORP Fire Protection Program." (S/RID)

### 2.2 References

1. HNF-IP-0842, RPP Administration.
  - Volume 9, Section 5.6, "Fire Protection System Testing, Inspection, and Maintenance."
2. NFPA 70, "National Electrical Code®."
3. NFPA 101®, "Life Safety Code®."
4. NFPA 241, "Safeguarding Construction, Alteration, and Demolition Operations."
5. NFPA 701, "Standard Methods of Fire Tests for Flame-Resistant Textiles and Films."
6. [TFC-BSM-IRM DC-C-02](#), "Records Management."

## 3.0 IMPLEMENTATION

Changes to this procedures are effective immediately. Affected personnel shall make themselves aware of the changes to this procedure.

## 4.0 REQUIREMENTS

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#### **4.1 Exits shall Remain Clear at all Times**

1. Every building exit and path to an exit shall be kept clear and unobstructed.
2. Exits shall not be locked in any way that prevents an individual from using the exit to leave the building.
3. Exterior building stairs shall be kept clean and unobstructed.
4. Exit doors shall not require more than one action to open.
5. Fire doors shall not be blocked open.

Emergency egress lighting shall be installed in accordance with NFPA 101<sup>®</sup>.

6. Emergency lights that are deficient shall be repaired/replaced within 24 hours, or portable lighting shall be provided at the affected area(s) until the permanent lights are restored to service.

NOTE: See HNF-IP-0842, Volume 9, Section 5.6, and TFC-BSM-IRM\_DC-C-02 for record requirements. (HNF-IP-0842, Volume 9, Section 5, is the Fire Protection Section containing all applicable TFC procedures.)

#### **4.2 Facilities Used by Mobility-Impaired Persons must have Accessible Exits**

1. Facilities used by persons with impaired mobility must have accessible exits designed to accommodate those persons. These facilities must have the same number of exits designed to accommodate persons with impaired mobility as are required for the unimpaired by NFPA 101.

NOTE: In general, most new facilities must provide access for persons with impaired mobility, but there could be cases where a facility's operation would pose a direct threat to persons with specific disabilities. In these cases, it may not be reasonable to design the facility for accessibility where a direct threat exists.

Existing facilities must have accessible exits according to this section if a person with impaired mobility is assigned to a building or must enter a building to perform their job.

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2. In this context, “accessible” means that, at minimum, the exit must provide an “area of refuge.”

NOTE: An “area of refuge” is a space that is separated from other areas of the building by one-hour fire rated, smoke resistant partitions (including the ventilation to the space) and is large enough to accommodate one wheel chair (30 by 48 inches) without reducing the remaining unobstructed passage width to less than 36 inches.

NOTE: Facilities with automatic sprinklers have less stringent requirements for the “area of refuge.” Call your fire protection engineer for details and requirements.

3. Each area of refuge must be identified with an AREA OF REFUGE sign that complies with ANSI A117.1.
4. Any exit that cannot accommodate persons with impaired mobility must be marked with a sign that clearly indicates where the nearest area of refuge is located.
5. The signs required by items 3 and 4 above must be illuminated the same as exit signs.

#### **4.3 Minimum Clearance must be Maintained Between Storage and Sprinkler Heads**

At least 45.7 cm (18 in.) vertical clearance shall be maintained between the top of storage and sprinkler head deflectors.

NOTE: This does not apply to storage shelves and cabinets located against the wall.

#### **4.4 Amount of Combustible Materials Allowed to Accumulate must be Limited**

1. Accumulations of combustible materials shall be limited to the quantity required for current needs.
2. Accumulations of combustible materials shall be separated from ignition sources.

#### **4.5 Housekeeping Requirements for Controlling Combustibles**

1. Workroom floors are maintained clean and dry to the extent practical.
2. Combustible waste shall be collected in metal containers provided with lids. (Lids are not required for office waste cans.)
3. Combustible waste shall not be permitted to accumulate inside or adjacent to buildings.
4. Combustible materials shall not be stored in building stairwells or corridors.

NOTE: Combustibles stored in closed metal cabinets are permitted in corridors IF the cabinets do not reduce the required exit width of the corridors.

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#### **4.6 Non-Combustible/Fire Retardant Materials Requirements**

Non-combustible or fire retardant materials shall be used whenever possible.

#### **4.7 Combustibles in Nuclear Facilities (Reactor and Non-Reactor)**

1. Use and installation of combustible materials shall be maintained as low as reasonably achievable (ALARA).
2. Management shall ensure that the use of combustible materials is properly controlled and conforms to the following additional requirements.
3. Use of combustible materials in the construction of facilities and associated equipment shall be ALARA.

NOTE: This will usually mean that noncombustible substitutes are found for such common materials as wood, plastic insulation, and especially plastic finish materials. When the noncombustible classification of a material is in question, it must be reviewed and approved in writing by the fire protection engineer.

4. The selection and use of new insulated electrical wire for installation in cable trays shall be reviewed and approved by the fire protection engineer.

NOTE: Essential uses of combustible materials (such as plastic electrical and electronic components) are normally acceptable.

5. Use of essential permanent items (including laundry, personal protective equipment, and office materials) shall be maintained ALARA.
6. Wood, sheet plastic, and paper materials shall be strictly limited and are used only in temporary applications that are absolutely essential to facility operations when acceptable noncombustible substitute materials are not available. Essential written material can be permanent.
7. Wood scaffolding shall not be staged, stored, or stockpiled in the facility. This requires that assembly be performed when the scaffolding is delivered and removed as soon as it is not longer needed. The fire protection engineer may issue a written exception to this requirement for radiation areas if the staging/storage area is protected by automatic sprinklers.
8. Wood used in a nuclear facility for a temporary application as discussed above (except wooden ladders and scaffolding) shall be pressure-treated fire retardant material with an Underwriter's Laboratories (UL) classification of Fire Retardant (FR-S).

Individual unlabeled pieces of wood (e.g., from a bundle or made by cutting larger pieces) shall be labeled as "FR-S" before use.

9. In lieu of the pressure-treated wood required above, UL listed or Factory Mutual approved fire retardant coatings (paints) may be used in the following cases:

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- Where structural strength/qualification is required
- For untreated materials already in use.

NOTE: Such painted materials shall also be labeled "FIRE RETARDANT."

10. Sheet plastic shall be tested and documented as meeting NFPA 701, tinted pink, or FR stamped every six feet.

NOTE: Approved material is available under store stock Class 37, "Safety Equipment and Apparel."

11. Foil-backed craft paper shall not be used as welding tarps.
12. Materials of unusual fire characteristic (such as urethane foams which produce large quantities of smoke) shall not be used for interior finishes.

NOTE: This applies to all buildings (nuclear and non-nuclear).

#### **4.8 Pre-Construction Requirements**

1. The construction manager shall ensure that applicable permits are obtained prior to engaging in activities or processes governed by the permits. See the FPS.
2. Project management shall ensure that the Hanford Fire Marshal's office is represented at the project "kick-off" meeting where project scope and applicability of Fire Marshal permits and fire prevention programs shall be discussed.
3. The construction manager, as part of the hazard communication effort, shall complete the "Hanford Fire Marshal's Office Construction/Demolition Fire Safety Inspection Checklist" (site form [A-6002-692](#)) with the Hanford Fire Marshal and ensure the requirements are implemented.

#### **4.9 Temporary Construction Enclosures**

1. Separate construction-related structures, such as temporary offices and sheds having combustible construction or contents, from buildings under construction.
2. Automatic sprinkler systems piping or other fire protection equipment shall not structurally support temporary enclosures erected within a facility. Construct the enclosure supporting structures of noncombustible or fire-retardant materials approved by a TFC fire protection engineer/Hanford Fire Marshal.

NOTE: Fire retardant material includes pressure-treated wood with an UL classification of "FR-S" or material treated with UL listed or Factory Mutual approved fire retardant coating (paint).

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3. Use non-combustible or fire-retardant materials approved by a TFC fire protection engineer/Hanford Fire Marshal for enclosure walls, ceilings, and floors. Ensure that fabrics or plastic films used are certified as conforming to the requirements of the large-scale test described in NFPA 701.

#### **4.9.1 Sources of Ignition in and Around Temporary Enclosures**

1. Fasten the enclosing material securely and ensure it cannot be blown against heaters or other sources of ignition by the wind.
2. Enclosures and the area extending for ten feet around the exterior of the enclosures shall be posted as “no smoking” areas.

NOTE: This posting is not required inside of buildings since these locations are already designated as “no smoking” areas.

3. A Hanford Fire Marshal’s permit is required if sources of ignition such as portable heaters or open flame devices are to be used in or around the enclosure. See the FPS for additional information on the use of temporary heating equipment.

#### **4.9.2 Restrictions for Storage of Combustibles in and Around Temporary Enclosures**

1. Do not store combustible materials within the no smoking areas surrounding temporary enclosures.
2. Keep flammable or combustible liquids to an absolute minimum and store in and dispense from UL listed or Factory Mutual approved safety cans. Store clothes, rags, or waste soaked with flammable/combustible liquids in UL or Factory Mutual approved safety containers.
3. Remove combustible materials used in the enclosure (rags, paper products, etc.) immediately after use and store in approved metal containers with lids. Remove all combustible waste from the enclosure after each work shift.
4. Locate exhaust discharge from internal combustion engines and associated equipment away from combustible materials.
5. Keep combustibles and ignition sources away from flammable and combustible liquids and gases storage areas.
6. After dismantling combustible forms, scaffolding, or shoring, remove and store it at a location that does not present a fire exposure hazard to the structure or other equipment.

#### **4.10 Processes and Hazards**

1. Whenever possible, perform welding, cutting, open flame work, etc., in a designated area. See additional information on hot work in the FPS.

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2. Install, use, and maintain temporary heating equipment according to the manufacturer's instructions. See additional information on portable heaters in the FPS.
3. Store materials susceptible to spontaneous ignition, such as oily rags, in a listed disposal container. Remove accumulations of combustible waste material at least at the end of each work shift. See additional information on disposing of waste absorbent materials in the FPS.

#### **4.11 Electrical Utilities**

1. All construction-operation electrical wiring and equipment for heating, lighting, or power purposes shall be in accordance with NFPA 70.
2. Remove temporary wiring upon completion of construction or purpose for which the wiring was installed.

#### **4.12 Fire Protection at Construction/Demolition Sites**

The following requirements shall apply to construction/demolition sites, as applicable.

1. Fire protection must be provided on all construction sites, as required by applicable sections of NFPA 241 and NFPA 1141, "Fire Protection in Planned Building Groups." Conduct construction site safety/fire protection self-inspections weekly and document the inspection using the fire marshal supplied fire safety inspection checklist. Track any unsafe conditions identified until corrected.
2. Provide adequate portable fire fighting equipment (fire extinguishers, hoses, etc.) and training for the use of the equipment.
3. All firefighting equipment shall be periodically inspected and maintained in operating condition. Defective equipment shall be immediately replaced.
4. Where underground water mains and hydrants are to be provided, they shall be installed, completed, and in service, prior to accumulation of combustible materials on the project site, and prior to the completion of any project structure.
5. Construction sites shall provide and maintain fire department vehicle access.
6. Where required, secure construction sites from unauthorized entry; however, maintain unobstructed access for site emergency response vehicles to all areas and buildings. The access roads shall have an unobstructed driving surface width of at least 20 feet during all weather conditions, and be able to withstand the live loads of fire department apparatus.

Factors to be considered in determining the need for security should include the hazards at the site, the chance of arson or accidental fires, and the exposure fire risk. Vehicle parking, storage location of construction material, and interference of established access routes due to security fencing may not impede unobstructed access.

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7. Provide the site/project with two-way radio communications, telephone service, fire alarm box, or other means for the purpose of emergency notification.
8. Provide the site/project with water supply (as approved by the Hanford Fire Marshal) for firefighting capability, which includes strategically located hydrants at the site. Where a water supply is not available, construction permitting, fire prevention requirements, and fire loss liability shall be clearly established.
9. Provide projects with multiple level buildings with dry standpipe systems; consider the limitations of the site fire department/brigade when determining the need for dry standpipes in multiple level buildings during construction.

#### **4.13 Decommissioning of Fire Protection Features**

1. A permit must be obtained from the Hanford Fire Marshal's Office for the decommissioning.
2. In addition to obtaining a permit for the decommissioning or removal of a fire protection feature, an analysis which includes the following information shall be performed by a qualified fire protection engineer.
  - Facility. Identify the building number/name.
  - Summary/Conclusions. Provide a brief paragraph explaining the purpose of the analysis and the conclusions reached.
  - Property Book/Record Value. Identify what the property book/record value is for the facility. The value or maximum possible fire loss must be below levels that would require automatic fire suppression (\$1 million). It would also be appropriate to consider the potential loss/impact to exposures if any exist.
  - Radiological/Hazardous Material Release Analysis. This section should determine if there is a potential for a release that would exceed DOE guidelines and/or property loss criteria. The analysis needs to demonstrate that existing fire protection systems are not needed to prevent such an event from occurring or an event is not possible. See the TFC procedure on accident and hazard analysis process.
  - Personnel Occupancy/Life Safety Features. The purpose of this section is to ensure the life safety features are maintained if the building will be occupied. For the purpose of this section "occupied" is as defined by NFPA 101, which says when the building is open to or accessible to the public, or occupied by more than ten people.
  - Hanford Fire Department. The purpose of this section is to identify any changes that the Hanford Fire Department should be aware of for medical and fire emergency response efforts (e.g., suppression/detection systems removed from service, entry restrictions, etc.) The Hanford Fire Department must be notified of each facility planned for decontaminating and decommissioning so they can



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address the changes in areas such as pre-fire plans.

- Conclusion/Recommendations. The recommendations may say it is okay to remove systems from service or that they should remain in service until some additional items or hazards are addressed/mitigated.

3. The demolition permit and analysis package must be submitted to the Hanford Fire Marshal's Office for review and concurrence before any fire protection features are removed from service.

#### **4.14 Non-Emergency Use of Fire Hydrants**

This section provides the requirements and responsibilities for non-emergency use of fire hydrants which frequently takes place during construction/decommissioning activities. These requirements apply to all TFC-managed facilities, operations, and activities. Fire hydrant/water supply tests are exempt from these requirements.

1. Non-emergency tie-ins to fire hydrants are forbidden without a Nonemergency Hydrant Tie-In Permit (site form [BC-6000-784](#)).
2. The user shall observe any precautions specified on the tie-in permit to prevent damage to the fire hydrant or hoses (e.g., freezing weather precautions).
3. Approved non-emergency tie-in installation shall be as follows.
  - a. Install one non-rising stem gate valve with a 11.4 cm (4.5 in.) American National Fire Hose connection Screw Thread (NH) male outlet and a 11.4 cm (4.5 in.) NH female inlet on the hydrant.

NOTE: The 11.4 cm (4.5 in.) Valve and outlets are to be used by the Hanford Fire Department only.

- b. Next install a non-rising-stem gate valve with a 6.4 cm (2.5 in.) NH female inlet and a 3.8 cm (1.5 in.) NH male or female outlet on each hydrant outlet being used.

NOTE: Tie-in will only be made to a 6.4 cm (2.5 in.) connection.

4. The user shall provide and use an approved fire hydrant wrench to open and close a fire hydrant. Pipe wrenches shall not be used to open/close a hydrant.
5. When a tie-in is made to a hydrant supplied by the potable water system, a portable backflow prevention device or air gap shall be used. The portable backflow prevention device or air gap shall be approved by the Hanford Steam/Water Utilities water purveyor.
6. Fire hydrants and hoses shall be depressurized when not in used.
7. Hoses shall be routed to avoid presenting a hazard to employees or vehicles.
8. The user shall ensure that the hydrant is fully open or fully closed, in order to prevent the

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drip valve from causing drain washout.

## **5.0 RECORDS**

The following records are generated during the performance of this procedure.:

- 
- Hanford Fire Department Contractor Facility Pre-Fire Plan Request
- Construction/Demolition Fire Safety Inspection Checklist (site form A-6002-692)
- Nonemergency Hydrant Tie-In Permit (site form BC-6000-784).

Records shall be maintained in accordance with TFC-BSM-IRM\_DC-C-02.